REMARKS

By this Amendment, Claims 1-3 and 6-8 are amended, Claims 11-24 are canceled without prejudice or disclaimer, and Claims 25-26 are added. Thus, Claims 1-4, 6-9, and 25-26 are pending. Support for the amendments to the claims may be found at least on page 7, line 21, to page 8, line 29, page 10, line 28, to page 11, line 15, page 18, lines 5-9, and page 35, lines 18-23, of the application as originally filed. Accordingly, the Applicants respectfully submit that no new matter is presented herein.

Claim Rejections – 35 U.S.C. §102/103

Claims 1-4, 6-9 and 23-24 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,941,646 to Mori et al; Claims 1-4, 6-9, and 23-24 are rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,299,356 to Okamura et al.; and Claims 1-4, 6-9, and 23-24 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,000,850 to Takahashi et al. in view of U.S. Patent No. 5,504,637 to Asada et al. and U.S. Patent 5,746,516 to Miyasaka. Applicants respectfully traverse the rejection for at least the following reason(s).

Claims 1 and 6 recite a hydrodynamic type oil-impregnated sintered bearing that includes, among other features, wherein the rate of area of surface holes on the bearing surface is set within a range of 3%-15%, the lubricating oil or a base oil of the lubricating grease forms a lubricating film in the bearing clearance due to the hydrodynamic pressure generating grooves while circulating between the inside of the bearing body and the bearing clearance through the surface holes of the bearing surface, so that the lubricating film continuously supports the rotating shaft in a non-contact manner, and

the lubricating oil or a base oil of the lubricating grease is a lubricating oil selected from among mixtures of poly-α-olefin or hydrogenated compound thereof and ester.

It is the combination of features in Claim 1 that enable the present invention to prevent unstable vibrations such as a whirl, suppress denaturation or degradation of the lubricating oil or lubricating grease, and improve an evaporation characteristic of the lubricating oil or lubricating grease under an elevated temperature, to extend the life of the bearing. The present invention establishes the rate of area of surface holes on the bearing surface to an optimum range between 3% and 15%, while also selecting the optimum lubricant from among mixtures of poly-α-olefin or hydrogenated compound thereof and ester, to establish the non-contact support of the hydrodynamic type oil-impregnated sintered bearing involving the circulation of the oil (i.e., the lubricating oil or the base oil of the grease) and the formation of the oil film. In particular, to establish the pressure and thickness properties of the lubricating film to provide effective non-contact support to the rotating shaft, as recited in Claims 1 and 6, it is necessary to establish proper circulation of the oil in which fresh oil is continuously supplied from the inside of the bearing body to the bearing clearance through the surface holes of the bearing surface in order to form the oil film and then returned to the inside of the bearing body from the bearing clearance through the surface holes of the bearing surface. Thus, it is necessary to maintain the rate of area of surface holes on the bearing surface within a certain range. If the rate is excessive, for example, the amount of oil returning from the bearing clearance to the bearing body will be excessive, and the pressure of the oil film in the bearing clearance cannot rise sufficiently. Thus, Claims 1 and 6 establish the range of 3%-15% for the rate of surface area of surface holes on the bearing surface to

achieve a balance between the circulation of the oil and the formation of the oil film, thereby ensuring the non-contact support for the rotating shaft, as also recited in Claims 1 and 6. In addition, Claims 1 and 6 recite that the lubricating oil is selected from among mixtures of poly-α-olefin or hydrogenated compound thereof and ester, which contributes to prevent a whirl due to generation of bubbles in the oil and also to improve an evaporation characteristic of the oil under elevated temperature in order to extend the life of the bearing.

Mori discloses two bearing bodies 1 each having a bearing surface, wherein the inner peripheral surfaces of the bearing bodies 1 are formed with a plurality of hydrodynamic-pressure-generating grooves 5 and air current producing grooves 12. Although Mori discloses various types of lubricant (see Col. 8, line 32, to Col. 9, line 27), the lubricant is not impregnated in the bearing bodies 1 but in the oil supplying member 3 disposed between the bearing bodies 1. Furthermore, Mori fails to teach or suggest mixtures of poly-α-olefin or hydrogenated compound thereof and ester.

Okamura discloses a bearing 1 having a bearing body 1a, wherein the inner peripheral surface of the bearing body 1a is formed with a bearing surface 1b in which a plurality of hydrodynamic pressure generating grooves 1c are provided. Okamura also discloses various types of lubricant that are not impregnated in the bearing body but in the solid lubricating composition as an oil re-feeding member (see Col. 10, line 51, to Col. 11, line 33). Furthermore, Okamura also fails to teach or suggest mixtures of poly-α-olefin or hydrogenated compound thereof and ester.

Takahashi discloses a dynamic pressure bearing that includes dynamic pressure grooves 1 provided on a bearing surface 2 of a sleeve 3, the dynamic pressure grooves

being formed to eliminate voids so that dynamic pressure fluid never leaks out of the grooves 1. Takahashi teaches that the bearing surface of the bearing body is crushed so that substantially no voids (i.e., no surface holes) are present.

Asada discloses a disk rotating device that includes a sleeve 10 having radial bearing grooves 3A, 3B that are fed with a lubricant 11, the lubricant being composed of 90% or more of ester oil and the remaining 5% or less of mineral oil, olefin, hydrocarbon, and the like.

Miyasaka discloses a porous bearing system having a porous bearing 3 having hydrodynamic-pressure grooves 6 provided formed in the bore 5 of the bearing 3.

The Applicants respectfully submit that Mori, Okamura, Takahashi, Asada, and Miyasaka, alone or in any combination, fail to disclose, teach or suggest a hydrodynamic type oil-impregnated sintered bearing that includes, among other features, wherein the rate of area of surface holes on the bearing surface is set within a range of 3%-15%, the lubricating oil or a base oil of the lubricating grease forms a lubricating film in the bearing clearance due to the hydrodynamic pressure generating grooves while circulating between the inside of the bearing body and the bearing clearance through the surface holes of the bearing surface, so that the lubricating film continuously supports the rotating shaft in a non-contact manner, and the lubricating oil or a base oil of the lubricating grease is a lubricating oil selected from among mixtures of poly-α-olefin or hydrogenated compound thereof and ester, as recited by Claims 1 and 6. Accordingly, the Applicants respectfully submit that Mori, Okamura, Takahashi, Asada, and Miyasaka, alone or in any combination, do not anticipate or render obvious

that which is recited by Claims 1 and 6. The Applicants respectfully request that Claims 1 and 6 be deemed allowable for at least the reasons discussed above.

Claims 2-4 depend from Claim 1, and Claims 7-9 depend from Claim 6. It is respectfully requested that these dependent claims be deemed allowable for at least the same reasons Claims 1 and 6, respectively, are allowable, as well as for the additional subject matter recited therein.

Withdrawal of the rejections is respectfully requested.

New Claims 25 and 26

Claim 25 depends from Claim 1, and Claim 26 depends from Claim 6. The Applicants respectfully submit that Claims 25 and 26, respectively, are allowable for at least the same reasons Claims 1 and 6, respectively, are allowable, as well as for the additional subject matter recited therein.

Conclusion

In view of the foregoing, reconsideration of the application, withdrawal of the outstanding rejections, allowance of Claims 1-4, 6-9, 25 and 26, and the prompt issuance of a Notice of Allowability are respectfully solicited.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing docket number 100725-09009.**

Respectfully submitted,
ARENT FOX LLP

William D. Doyle
Registration No. 60,429

Customer No. 004372
ARENT FOX LLP
1050 Connecticut Avenue, NW, Suite 400
Washington, DC 20036-5339
Telephone: (202) 857-6000
Facsimile: (202) 857-6395
WDD: ayw